Information, retail channel and consumers WTP for food safety in Argentina.

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Abstract:

In Argentina, the incidence of hemolytic uremic syndrome (HUS) is high, with approximately 420 new cases observed each year. A strain called VTEC 0157 of Escherichia coli (E. coli) was identified as the primary cause of HUS. The retail sale of beef in Argentina is marketed mainly without labels, brands or certifications, in butchers shops that represent 75% of the market share. In the context of the Healthy Butchers program, bacteriological evaluations at butcher shops detected cross contamination of food with pathogens in beef retail environment. In this paper, we measure consumer preferences for selected food safety attributes in beef and butcher shops, taking their information and knowledge about safety into account. We use a discrete choice experiment to assess consumers WTP using primary data from Buenos Aires, Argentina. Results suggest that consumers' utility increases when there is a cashier at the butcher shop, the butcher wears gloves and uses recommended tables to cut meat, and beef products have a properly lay out at meat display fridge at consumers' sight. Consumers' knowledge and information about foodborne diseases and beef contamination risks increase the WTP for safety attributes at butcher shops. This effect is especially stronger for the last two mentioned attributes, which require a more detailed observation from consumers. Implications for food retail managers and policy-makers are discussed.

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In this paper, we measure consumer preferences for selected food safety attributes in beef and butcher shops, taking their information and knowledge about safety into account.

We use a discrete choice experiment to assess consumers WTP using primary data from Buenos Aires, Argentina. Results suggest that consumers' utility increases when there is a cashier at the butcher shop, the butcher wears gloves and uses recommended tables to cut meat, and beef products have a properly lay out at meat display fridge at consumers' sight. Consumers' knowledge and information about foodborne diseases and beef contamination risks increase the WTP for safety attributes at butcher shops. This effect is especially stronger for the last two mentioned attributes, which require a more detailed Observation from consumers. Implications for food retail managers and policy-makers are discussed.

1. Introduction

Foodborne diseases have been and still are an important health problem all over the world. Mass media and growing exposure to information do not assure better-informed agents with the ability to distinguish risks and prevent them. According with WHO studies, the global burden of foodborne diseases in 2010 estimated that 31 hazards (including viruses, bacteria, protozoa, helminths and chemicals) caused 600 million foodborne illnesses globally and 420.000 deaths[1].

[1] Strengthening surveillance of and response to foodborne diseases: a practical manual. Introductory module. Geneva: World Health Organization; 2017.

Escherichia coli (E. coli) is a bacterium. A strain called VTEC O157 is an uncommon cause of infection, but it can be serious. It can cause outbreaks or sporadic cases of other serious diseases such as hemolytic uremic syndrome (HUS). E. coli O157:H7 was first identified as a human pathogen in 1982 and currently it is the most prevalent VTEC serotype (Signorini and Tarabla, 2010).

Argentina has the highest incidence of HUS in the world, with approximately 420 new cases observed each year with an incidence of 12.2 cases per 100,000 children in the age group of 0-5 years (Ministry of Health, 2014). In children, HUS is the leading cause of acute renal failure and the second leading cause of chronic renal failure. Approximately 20% of children receiving kidney transplants suffered from HUS (Ministry of Health, 2014). Although a variety of foods have been implicated in those outbreaks, raw or undercooked meals of bovine origin are primarily responsible (Signorini and Tarabla, 2010).

In the optimal market scenario, consumers make their purchase decisions having a full and correct understanding of how their choices will affect their well-being. However, food safety is a credence attribute, usually not observable by consumers at the time of purchase. In this case, without extrinsic cues to inform consumers on credence quality attributes of beef, i.e. label information, demand fails to lead the market to enhance food safety. Labeling is an answer to the imperfection dilemma in the beef chain with many different functions for both sellers and consumers (Loureiro and McCluskey, 2000; Caswell and Anders, 2011). The correct dissemination of information reduces the level of asymmetric information between producer and consumer, and the consumer risk related to quality and beef safety (Bernuès et al., 2003).

Food safety issues often arise from problems of asymmetric information between consumers and suppliers in relation to product-specific attributes or characteristics. Third-party certification and traceability networks are examples of systems used to help bridging the information gap between market players and to reduce inefficiencies that arise from asymmetric information (Ortega et al, 2011).

Beef retailing in Argentina is mainly marketed without product brands or labels on specialized and small stores (butcher shops) which represent 75% of the market share (IPCVA, 2017). Argentinian consumers prefer meat cut and packaged at the purchase moment (Colella and Ortega, 2017). Therefore, the opportunities for developing a labeling scheme are very low. Additionally, the butcher also plays an important role in the communication process of beef attributes. Consumers appreciate attributes such as

advice and the opportunity of choosing the meat cut and they trust to butcher shops rather than supermarkets to provide them (Colella and Ortega, 2017).

Although consumers are highly concerned about food safety, their purchasing behavior is not always congruent with this statement. Consumers differ in their psychological, attitudinal and cultural characteristics and they react in a specific manner when facing food related hazards (Verbeke *et al*., 2007). Consumers' choices and their purchasing behavior depend on their own risks perceptions and preferences, but their decisions are a very dynamic process. A new context of information and their own experiences may change their preferences and choices.

In 2010, the Institute of Genetic Veterinary Ing. Fernando Noel Dulout (La Plata University – CONICET) began the "Healthy Butcher Shops" Program[2]. The aims of this program were: a) to perform a comprehensive evaluation of butcher shops, including risk quantification and determination of bacteriological quality in raw ground beef and environmental samples; b) to implement improvement actions for both butcher shops and consumers; and c) to verify the impact of such improvement actions. At the initial risk quantification analysis of the program, the researchers informed 50% high risk, 39.5 % moderate-risk and 10.5% low risk at butcher shops (Leotta et al, 2016).

The results of a pilot experience confirm the feasibility or implementing a comprehensive risk management at butcher shops, and the importance of information campaigns targeting consumers [3](Leotta et al, 2016).

For this reason, in our study, a choice experiment approach is used to estimate Argentinian consumers' willingness to pay (WTP) for selected food safety attributes in beef and butcher shops. Specifically, we take into account food safety risk perceptions and knowledge about HUS. The attributes selected are extrinsic quality indicators and cues that the experts of "Healthy Butcher Shop" program choose, recommend and then monitoring its compliance: 1) specific utensils to handle meat (cutting tables and knives), 2) no contact between the butcher´ hands and the money and 3) a specific lay out in the meat display fridge.

This rest of the article is organized as follows. First, the background of this research. Second, the methodology applied (a choice experiment) and the survey characteristics.

[2] The program was supported by public science and technology organisms in Argentina (CONICET and Science and Technology Agency) and by the Argentine Beef Promotion Institute (IPCVA), a public organization with private funding from beef sector producers.

[3] The experience period lasted from 2010 to 2013 and it was conducted in Berisso, a city of Buenos Aires, with the authorization of local health and supervision authorities.

Third, the survey results from consumer perceptions about food risks. Fourth, the definition of informed consumers. Fifth, the estimation results of WTP for butcher shop safety attributes. The estimation includes two sets of WTP provided by two different conditional logit models, with and without taking into account the effect of consumers' knowledge about HUS. Finally, some concluding remarks are drawn.

2. Background

The beef market and beef consumer behavior have been extensively analyzed in different countries all over the world. Many of these analyses are focused on estimations of willingness to pay for certifications of quality and safety attributes, such as the products origin, to be free of hormones and antibiotics or the use of specific processing methods. The research in more developed countries, where beef is marketing packed and labeled, focus on the level, quantity and quality of information that should be provided by labels to contribute to consumer best choices. Barrera Figueroa and Sánchez García (2006), Loader and Hobbs (1999), Hui et al. (1995), Northen (2001), Sánchez et al. (2001), Stefani and Henson (2001) and Latvala and Kola (2004) highlight the importance of labels and certifications as safety signals in beef markets under asymmetric information. However, in Argentina, most consumers at domestic markets are less interested in certifications, even though they declare to be as worried about food safety as the consumers in other countries - according to Loureiro and Umberger (2007) and Font-i-Furnols and Guerrero (2016). Few of them responds to quality certifications incentives (Casellas *et al.*, 2004), there are not generalized traceability systems and their willingness to pay for certification of a process which improves safety controls is very low (Berges and Casellas, 2008; Berges and Hedo, 2009). Argentinean consumers choose food products either looking for brands or selecting the most reliable place of purchase.

The beef market and the characteristics of its retail marketing provide good opportunities to investigate about the complex relationship among consumers' perceptions, knowledge and information about safety and public regulations. Beef is a food consumed in 92% of the households in our country, although other meats consumption (especially chicken) has increased in the last decade according with the National Survey data of Households Expenses 2012/ 13 (Pace Guerrero *et al.*, 2014).

Consumers prefer buying beef at butcher shops where meat products sell fresh by cuts handled by the butcher. Errea et al. (2013) did a choice experiment to explain the decision process to buy beef using four attributes: the preferences of retail marketing, a safety certification for the place of purchase, the color of meat and its price. They found that the attribute that most contributed to increasing consumers' utility was the first listed. That is, they preferred the interaction with the butcher at the counter before that their own selection of packed beef products from the shelves of the supermarket.

For the beef purchase decision, Berges et al, (2015) postulated that consumers first choose the place of purchasing, and then, in a second stage, the desired beef products. In this way, consumers assess the store attributes to infer the beef safety. The mechanism commonly used is the experience, as seems to suggest the observed consumer loyalty to a same butchery. The safety attributes most referred by consumers are those having a low verification cost: general cleaning perception of the place and the presence of a cashier in the store. Another attributes, more specific such as the butchers clothing or sanitary controls check list were usually less reported. Although some consumers were sensible to these safety characteristics, many of them could not remember these "details". This behavior assume that consumers are often misinformed or possess limited knowledge about foodborne diseases.

Public information campaigns, which aim to inform consumers about the importance of good hygiene practices, both at home and in the places of sale, could improve households' health status reducing the risk of food contamination. Nevertheless, the effectiveness of this policy depends on consumers' ability to understand the information. Better-educated consumers have more chances to enhance their health knowledge or promote changes in social norms (Etilé, 2011).

Besides safety strategies implemented along the food chain by producers, firms and governmental agencies, consumers' perceptions and behavior will ultimately have a great impact on the food industry. Consumers' food choices seem to be full of contradictions in relation to safety and foodborne diseases hazards. There is often inconsistency between what individuals tell they will do and what they actually do. Not all consumers are informed about good safety basic practices manipulating food. A research done by The American Meat Institute in 2009 (mentioned by Fox J., 2011), reported that only one third of the respondents knew the degree of cooking that burgers needed to reduce the probability of E. Coli infection.

3. Survey and methodology

The source of information for this research comes from a survey carried out during the period December 2014 – February 2015 on individuals of 18 – 72 years old from the Metropolitan Area of Buenos Aires (AMBA). Each individual came from a beef consumer household. The sample design was stratified for the Autonomous City of Buenos Aires (CABA) and the first ring of Greater Buenos Aires (GBA), with sex, age and education global shares. The result was 301 valid answers according to these proportions.

The survey inquired into beef purchasing preferences, emphasizing on health risk perceptions and the knowledge about safety practices to reduce them. There were included questions about contamination from *E. Coli*, HUS and the purchase election process (especially the valuation of the store attributes that guarantees more safe characteristics of the product).

The main part of the survey is the choice experiment (CE) which consists on simulating the butchery characteristics election where the respondent would purchase the meat. The CE consists on facing each person with two cards, each with three pictures of hypothetical butcher shops and its retail price of the beefsteak[4]. The pictures (Figure 1) show different practices of the shops related to the safety of the products they offer and its price. These practices include the correct use of utensils, the presence of a cashier who is not in contact with the meat, and the usage of trays to order and separate different products.

The cards or choice sets contain different combination of pictures and prices. Each respondent was asked to decide from which of two hypothetical purchase situation he would prefer to buy one kilogram of beefsteak.

The experiment's objective is to estimate the respondents' average willingness to pay (WTP) for each of the mentioned "good practices". The number of choice sets multiply the quantity of answers, because each respondent faces 4 choice sets. The experiment is unlabeled, thus the amount of possible choice sets equals L^A, where A is the number of attributes and L is the number of levels. In this case: $L^A = 2^4 = 16$. The experiment design is orthogonal, which implies that all attributes are independent of each other (Hensher et al., 2005). Once generating the design for the 16 treatments, 8 of them are selected and the attributes combinations are showed in cards, as it is illustrated in Figure

[4] Beefsteak was selected because it is consumed in most households and its price is generally well known.

1 for 2 of the 4 possible sets included in the CE for each sampled unit. Table 1 shows the four selected attributes, each one with 2 levels.

In every CE, the interviewed person faces an actual purchase situation, so he/she can choose according to his/her preferences. It is assumed that butcher shops only differentiate from each other in the attributes included in the cards, while the rest of their characteristics are the same, as location or customer attention quality. It is also supposed that there is no difference in meat quality, including tenderness, flavor and fat content.

Table 1 – Attributes of the *CE*

ATTRIBUTES	Task of the person who manipulates meat	Type of utensils and butchers clothing	Display of the goods in the fridge	Price per kilogram of beefsteak
Levels	Just manipulates meat. There is a cashier.	The butcher uses gloves and plastic tables.	Ordered in specific trays for each good.	AR$65
	The cashier manipulates meat.	He does not use gloves and there are wooden tables.	Without order or in the same tray.	AR$80

To estimate the WTP a Conditional Logit (CLM) model is used, which coefficients measure the effects of the attribute variables on the utility function, defined as the Random Utility Theory of McFadden[5]. Measures of the WTP are calculated as the ratio between two estimated parameters statistically significant (Hensher *et al.,* 2005). The price attribute is on the denominator and the ratio is understood as a price change associated with a unit increase on a given attribute.

[5] Consumers choose alternatives that report a higher utility, faced to time and budget constraints. Their choices differ because this utility function is composed of a systematic and a random term: $U_{ij} = V_{ij} + \varepsilon_{ij}$. The systematic term depends on product attributes and consumer characteristics. In this case, V is a linear combination of attributes (X) and parameters (β) and errors are IID assumed with a Gumbel distribution.

Figure 1 – Example of two of the choice sets included in the CE

Note: The Spanish text in the pictures describes the choice attributes.

4. Risk perceptions on beef consumption

Nestle (2003) describes two approaches to evaluate the acceptability of a given risk, one from a scientist point of view and the other from the perspective of people's beliefs. The first one characterizes risks and its costs and benefits. The second approach is based on values and beliefs and involves psychological, cultural and social perspectives. The author holds that individuals, in general, are more worry about and less willing to accept risks that they feel as unknown, hard to understand, out of control, involuntary and unfair.

Results from focus groups, implemented before designing the survey, follow the second approach. Participants referred to biological agents, especially E. Coli, but they did not clearly perceive risk from contamination with chemical agents residuals. They assumed its existence but recognized their own incapacity to identify it. They manifested that producers and public organisms should control this risk. Biological contamination was more familiar for them and they considered that safety practices could control it.

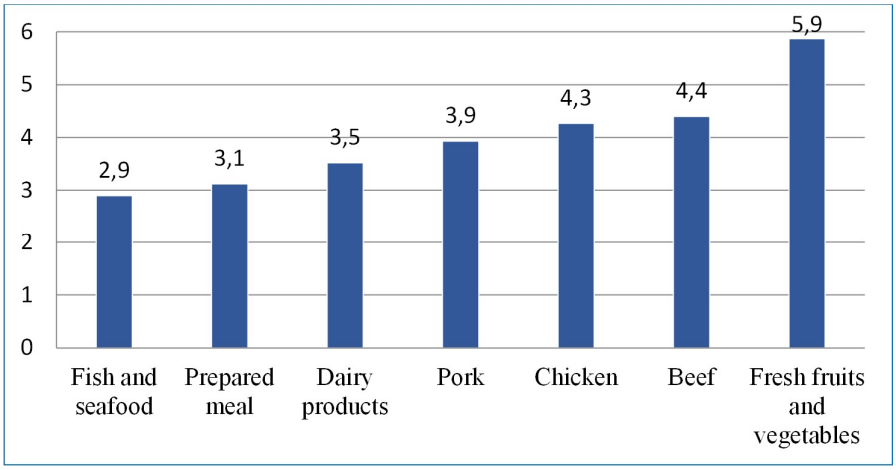
Although they highlighted the freezer as a way to preserve food, many participants considered that frozen goods were more dangerous than natural goods. Natural was associated with harmlessness.

To reduce food consumption risks, participants concluded that the strategies started at the purchase moment but should also continue at home. The main practices were: checking expiration date, buying products in reliable places and keeping the cold chain. In relation with beef handling and consumption, specific practices were preferred: freezing beef, using specific tables and knives and a high level of cooking.

According with these preliminary results, consumers had better knowledge about good safety practices at home than about food contamination risks. Survey results confirmed this presumption.

Respondents were asked to rank some type of food from 1 to 7 ordered by the level of perceived health risk, where 1 is the highest and 7 the lowest. Figure 2 indicates that beef was considered the less risky within the meat food group. The question was oriented to health risks from food contamination.

Figure 2 – Average food ranking based on the order given by respondents to health risk perceived.



Source: Survey data

From another questions included in the survey, 72.8% of the respondents had heard about EC, however only 45.5% knew that EC is a bacterium. Related to HUS, results were less satisfactory, because around 38% of beef consumers had never heard about this serious disease. In order to assess the knowledge about EC and HUS, the respondents should select if a series of assessments were true (T), false (F) or unknown (U). Table 3 lists the statements, where the percentages of right responses are highlighted.

Table 3 – Respondents' knowledge about EC and HUS

	T	F	U
EC can be responsible for HUS disease	**31 %**	5 %	64 %
HUS is a disease that affects especially countries of Africa	11 %	**26 %**	63 %
HUS only affects animals and it is not transmitted to humans	3 %	**53 %**	45 %
HUS affects especially children under 5 years old	**33 %**	14 %	53 %
Argentina is the country with more cases of HUS per inhabitant	**9 %**	15 %	76 %
HUS is caused by excessive beef consumption	9 %	**41 %**	49 %

This knowledge requires qualified information not easily accessible for everybody - as an average of 58.1% unknown responses indicates. These results significantly change when the respondents or someone close to them had been sick from EC infections or HUS. In these cases, there is less misinformation.

According to the focus groups results, the survey respondents are relatively better informed about safety practices when handling and cooking beef. Table 4 shows 83.7% of right responses. Consumers have more chances to better understand this kind of information because many of these practices became social norms.

Table 4. Respondents' knowledge about safety practices

The following practices reduce risk of illnesses	T	F	U
Cooking sufficiently the meat	**94.7%**	5 %	0.3%
Judging burgers safety by its appearance	29.2%	**66. 5%**	4.3%
Freezing food to kill bacteria	22.6%	**69.4%**	8%
Washing hands before cooking and eating	**99.3%**	0.7%	-
Using different utensils to handle raw meat	**88.7%**	9.3%	2.0%

5. Definition and characteristics of "informed" consumers

The "informed" variable indicates the respondent knowledge about E. Coli (EC) and the Hemolytic Uremic Syndrome (HUS). An "informed" individual is defined as an individual who knows that the EC is a bacterium, that HUS is transmitted to humans and that it is not caused by excessive meat consumption. They represent 28% of the sample, which means that less than a third of the respondents are well informed about these topics. Table 5 presents socio demographic characteristics and the sample distribution, distinguishing between informed and not- informed individuals. In the first group there is proportionally more women, individuals aged between 40 and 69, relatively better educated and richer and living in better neighborhoods in the city.

An association analysis performed between "being informed" and other variables from the survey, confirmed what can be deduced from Table 5. Within the women group, the percentage of informed is higher -34.4%- compared with the men group - 21.5% - and within the categories of education, informed consumers are 47.5% at the highest level and 8.8% at the lowest.

Moreover, 53.7% of the informed individuals has suffered HUS or knows somebody who has become ill with this disease (opposite to 24.5% of individuals not informed). These results show that both education and experience contribute to the population knowledge, justifying the role of public information campaigns as a means of raising awareness about good food safety practices.

An interesting result comes from the comparison of informed and not informed groups' perceptions about risks and food safety. For the former, the main food safety warranty is the public control. For the latter it is the purchasing place. Also, informed individuals perceive proportionally more risk in the following stages of the meat production chain: transportation to the sale points, the retail sale and meat handling in restaurants and butcher's shops.

Table 5 – Sample distribution and individuals characteristics classified by their information level.

	Total	Informed	Not Informed
Number of respondents	301	85	216
Gender			
Women	52.2%	63.5%	47.7%
Men	47.8%	36.5%	52.3%
Age			
17 - 20 years old	4.3%	1.2%	5.6%
21 - 39 years old	49.2%	49.4%	49.1%
40 - 69 years old	40.5%	47.1%	38%
Elder	6.0%	2.4%	7.4%
Education level			
Elementary or lower	19.3%	5.9%	24.1%
High School	38.5%	25.9%	43.5%
University/College	42.2%	68.2%	31.9%
Household income			
Lower than $4000	2.0%	0%	2.8%
Between $4000 and $8000	16.6%	9.4%	19.4%
Between $8000 and $15000	29.6%	28.2%	30.1%
Higher than $15000	24.3%	37.6%	19%
Not answered ([6])	27.6%	28.7%	28.7%
Neighborhood or place of residence			
Palermo	4.0%	3.5%	4.2%
Flores	7.3%	5.9%	7.9%
La Boca	6.3%	3.5%	7.4%
Liniers	6.0%	3.5%	6.9%
Recoleta	7.3%	9.4%	6.5%
Balvanera	9.3%	11.8%	8.3%
Villa Crespo	10.0%	16.5%	7.4%
San Isidro	16.6%	9.4%	17.1%
Avellaneda	16.6%	18.8%	15.7%
Lomas de Zamora	16,6%	16,5%	16,7%

[6] The respondents who did not answer this question, agreed to assess qualitatively their household income status. The 4% of the responses was low income, 10% middle-low income, 66% medium income, 19% middle-high and 1% high income.

6. Results from WTP estimations

Two different CLM models were estimated. The first one (M1) includes in the utility function the four attributes variables exclusively. The second one (M2) includes additional variables defined as the interactions between the attributes variables and the informed consumers (a dummy variable that takes the value 1 if the individual is an informed consumer, according to the mentioned definition). The main idea in M2 is to identify the effect of knowledge on the selected alternatives from a choice set.

$$V_{ij} = \beta_1 Cashier_{ij} + \beta_2 G\&T_{ij} + \beta_3 BPOrdered_{ij} + \beta_4 Price_{ij} + \varepsilon_{ij} \qquad \text{(M1)}$$

$$V_{ij} = \beta_1 Cashier_{ij} + \beta_2 G\&T_{ij} + \beta_3 BPOrdered_{ij} + \beta_4 Price_{ij} + \beta_5 Cashier * informed_{ij} + \beta_6 G\&T * informed_{ij} + \beta_7 BPOrdered * informed_{ij} + \beta_8 Price * informed_{ij} + \varepsilon_{ij} \qquad \text{(M2)}$$

- *Cashier:* the butcher just manipulates the meat. There is a cashier in the store.
- *G&T:* the butcher wears gloves and tables are not made of wood.
- *BPOrdered:* beef products are separately displayed in trays at the meat display fridge.
- *Price*: price per beefsteak kilogram.

Table 6 shows both models estimates. All the coefficients are statistically significant -except for the interaction price-informed in M2- and they have the expected signs. Consumers' utility increases when there is a cashier in the butcher shop, the butcher wears gloves and uses recommended tables and beef products properly displayed at consumers' sight and it lowers with the price.

The effect of "being informed", in M2, raises the utility for consumers with this characteristic respect to those who do not have it. Thus, well-informed consumers obtain more value from these three hygiene attributes. Moreover, it is remarkable that their utility increase proportionally more with the presence of the last two characteristics, which are relatively less obvious and introduce more specific hygiene practices.

As it was explained before, WTP for each of three attributes is calculated as a ratio ($-\hat{\beta}_{attribute}/\hat{\beta}_{Price}$), measuring the price change needed to compensate another attribute change with the total utility and the remaining attributes constant –the marginal substitution rate-[7]. In the M2 case, two sets of WTP are obtained: the not informed (NI) consumers' WTP (which is calculated through the same ratio referred above) and the informed (I) consumers' WTP, (which includes the estimates of the interaction variables

[7]Marginal substitution rate expression is: $dV = \hat{\beta}_{attribute} * d(attribute) + \hat{\beta}_{price} * dPrice = 0$

in the following form: $-(\hat{\beta}_{attribute} + \hat{\beta}_{attribute} * informed)/(\hat{\beta}_{Price} + \hat{\beta}_{Price} * informed))$.

Table 6. Estimated Coefficients from M1 and M2 models

Variable	M1				M2			
	$\hat{\beta}$	Std. Error	Z	P Value	$\hat{\beta}$	Std. Error	z	P Value
Cashier	0.7185	0.1075	6.69	0.000	0.6283	0.1232	5.100	0.0000
G&T	0.3449	0.1095	3.15	0.002	0.2119	0.1281	1.650	0.0980
BPOrdered	0.3717	0.0942	3.95	0.000	0.2828	0.1083	2.610	0.0090
Price	-0.0455	0.0075	-6.05	0.000	-0.0430	0.0091	-4.740	0.0000
Cashier*Informed					0.4175	0.2194	1.900	0.0570
G&T*Informed					0.5612	0.2130	2.630	0.0080
BPOrdered*Informed					0.3942	0.2077	1.900	0.0580
Price*Informed					-0.0136	0.0154	-0.880	0.3800
	Log Likelihood: -798.743 χ2Wald = 5.,11 P > χ2 = 0.0000 Adjusted Std. Error for 301 clusters ID				Log Likelihood: -795.644 χ^2Wald = 87.63 $P > \chi^2$ = 0,0000 Adjusted Std. Errors for 301 clusters ID			

Tables 7 and 8 present M1 and M2 WTP estimates and their 95% confidence intervals. From both models, the most valuable attribute for consumers is a cashier at the purchasing place, M1 WTP is 24% above the lowest price presented in the CE and M2 WTP is 22% and 28% for NI and I consumers, respectively.

Following with the WTP higher values, according M1 estimates, the good practices of displaying meat products becomes the second (12.5%) and meat handling is the third (11%). The same order arises for NI M2 estimates, being WTP values for both mentioned attributes 10% and 7.5%[8].

However, the way that I consumers value these attributes is the opposite, good practices of meat handling WTP (22%) is higher than good practices of displaying meat products (18%). Better consumers' knowledge about meat biological contamination risks increases the importance of hygiene recommendations related to butcher hands and the utensils he uses.

[8] Percentages calculated above the lowest price presented in the CE (AR$ 65).

Table 7. M1 WTP estimates for safety butcher practices attributes (AR$ December 2014)

Attribute	Average WTP (AR$ per beefsteak kg.)	Std. Error	CI
Cashier	15.81***	2.49	(20.70 - 10.91)
G&T	7.59***	2.29	(12.08 – 3.09)
BPOrdered	8.18***	1.92	(11.95 – 4.41)

*** Significant p-value < 0.01

Table 8. M2 WTP estimates for safety butcher practices attributes (AR$ December 2014)

Variable	Not informed (NI)			Informed (I)		
	Average WTP (AR$ per beefsteak kg.)	Std. Error	CI	Average WTP (AR$ per beefsteak kg.)	Std. Error	CI
Cashier	14,61***	2,92	(20,34 - 8,88)	18,49***	4,43	(27,17 - 9,81)
G&T	4,93*	2,8	(10,41 - -0,56)	13,67***	3,93	(21,37 - 5,97)
BPOrdered	6,58***	2,27	(11,03 - 2,12)	11,97***	3,44	(18,72 - 5,22)

*** Significant p-value < 0.01; * significant p-value < 0.1.

These estimates are consistent with responses obtained from a question formulated in the survey after implementing the choice experiment. Respondents were asked to choose three (from a list of nine) safety characteristics of beef retailing place they consider the most important. The characteristics listed were: 1) the place cleanliness is remarkable, 2) the butcher does not handle money, 3) the date of the last sanitary control is visible, 4) the butcher wears gloves, 5) there is not meat out of the fridges, 6) meat products have a properly ordered lay out at the display fridge, 7) the back room of the purchasing place can be seen by the shoppers, 8) the table used to cut the meat is not wooden made and 9) prepared and raw meat are kept in different fridges.

The difference among the WTP estimates in Table 7 is consistent with the percentages of respondents' election to each alternative listed in the previous paragraph. While the presence of a cashier was chosen in the 50% of the cases, the remaining characteristics had lower percentages –the usage of gloves (30%), meat lay out (24%), and the usage of specific tables (18%).

An interesting fact that arises from our survey data is the inconsistency among the responses about safety characteristics that consumers declare as the most important ones and the safety characteristics that they describe of the purchasing places where they actually buy the meat. According to Fox (2011) the observed consumers behavior (what they actually do) differs from their declared behavior (what they say they will do or

value). In spite of the positive valuations of the characteristic related to the use of hand gloves, 66% of the survey respondents did not remember if their trustworthy butcher wears gloves or said he did not. The only observed difference in actual beef purchasing behavior between NI and I consumers observed is that the latter group did remember better the characteristics of their purchasing place.

7. Concluding remarks for policy implications

Consumers' decisions depend on their preferences and the products' attributes. Preferences differ across individuals according to their perceptions, built through a dynamic process throughout life. This construction develops through the accumulation of direct experiences, the information received and the inferences made from both. In the case of perceptions on food health risks, individuals' beliefs and knowledge are an essential part in their expectations formation. Consumers usually have some information concerning to this topics, but their knowledge is far from being expert.

Understanding consumers' perceptions on food safety attributes is an important issue to develop more effective strategies to manage the risks and its communication.

Beef consumers are willing to pay a higher price (more than a 7.5% and less than 28% above the regular price) for butcher shops safety attributes. According to their statements, the most valuable butcher shop characteristic is the presence in the place of a cashier to avoid butcher handling the money. To a lesser extent, they value other characteristics as the properly lay out of the products at the meat display fridge and good practices of clothing and handling working utensils.

However, consumers' valuations significantly change when they have relatively more knowledge on foodborne diseases and beef contamination risks. There is a gap between WTP estimated for informed and not informed consumers, and it widens as less evident or more specific safety attributes are. All consumers recognize the importance of butcher shops having a cashier and the WTP gap due to consumers' information level is 26%. Nevertheless, the same gap is broader for the rest of the attributes despite consumers concerns about food safety. Informed consumers are willing to pay 177% more for good practices of handling beef at butcher shops and 82% more for the recommended lay out of the products, respect to those who are less informed.

Good practices of hygiene in beef handling are more important to contribute individuals' health when food has less degree of cooking and when individuals are the most vulnerable

segment of the population (children and elder people). Public regulations and sanitary control policies are essential, but public information campaigns to improve good food safety practices, both at home and in retail purchasing places, are essential as well.

Food safety information becomes a key issue, justifying effective communication policies design to reduce the knowledge gap of food contamination risks among individuals. Although public interventions must target to the entire population, they should focus on less educated individuals, to promote safer social norms. The effectiveness of public information campaigns depends on consumers' ability to understand the information and higher education consumers have more chances to enhance their knowledge or adopt healthy habits. Under this perspective, programs that improve safety standards in the supply side of the market –like Healthy Butcher Shops- and periodic controls at the retail marketing level would have a more equitable effect to improve public health and individuals' welfare.

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